CLAIMS

What is claimed:

1. A purified peptide comprising an amino acid sequence selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 8, and SEQ ID NO: 9.
2. The purified peptide of claim 1 the amino acid sequence is a fragment of the amino acid sequence selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 8, and SEQ ID NO: 9.
3. The purified peptide of claim 2 where the fragment comprises a contiguous sequence of at least 5 amino acids.
4. The purified peptide of claim 2 where the amino acid sequence of the fragment is selected from the group consisting of SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 10, and SEQ ID NO: 11.
5. The purified peptide of claim 1 the amino acid sequence is a derivative of the amino acid sequences selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 8, and SEQ ID NO: 9.
6. The purified peptide of claim 1 where said peptide is capable of binding to a strain of Francisella.
7. The purified peptide of claim 6 where the strain of Francisella is selected from the group consisting of *F. tularensis*, *F. tularensis* LVS, *F. philomiragia*, and *F. novicida*.
8. A purified peptide comprising an amino acid sequence selected from the group consisting of SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 10, and SEQ ID NO: 11.
9. The purified peptide of claim 8 where the amino acid sequence is a fragment of the amino acid sequences selected from the group consisting of SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 10, and SEQ ID NO: 11.
10. The purified peptide of claim 8 where the fragment comprises a contiguous sequence of at least 3 amino acids.
11. The purified peptide of claim 1 the amino acid sequence is a derivative of the amino acid sequences selected from the group consisting of SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 10, and SEQ ID NO: 11.
12. The purified peptide of claim 8 where said peptide is capable of binding to a strain of Francisella.
13. The purified peptide of claim 12 where the strain of Francisella is selected from the group consisting of *F. tularensis*, *F. tularensis* LVS, *F. philomiragia*, and *F. novicida*.
14. A purified polypeptide comprising an amino acid sequence at least 50% identical to an amino

acid sequence selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 8, and SEQ ID NO: 9.

15. The purified peptide of claim 14 where said peptide is capable of binding to a strain of Francisella.

16. The purified peptide of claim 15 where the strain of Francisella is selected from the group consisting of *F. tularensis*, *F. tularensis* LVS, *F. philomiragia*, and *F. novicida*.

17. A purified polypeptide comprising an amino acid sequence at least 50% identical to an amino acid sequence selected from the group consisting of SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 10, and SEQ ID NO: 11.

18. The purified peptide of claim 17 where said peptide is capable of binding to a strain of Francisella.

19. The purified peptide of claim 18 where the strain of Francisella is selected from the group consisting of *F. tularensis*, *F. tularensis* LVS, *F. philomiragia*, and *F. novicida*.

20. A nucleic acid sequence coding for a polypeptide having the amino acid sequence selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 8, SEQ ID NO: 9.SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 10, and SEQ ID NO: 11.

21. An expression vector comprising the nucleic acid of claim 20 operably linked to an expression control sequence.

22. A cultured cell comprising the expression vector of claim 21, or a progeny of said cell, wherein said cell expresses the polypeptide.

23. A method of identifying a peptide that binds to a *Francisella* strain comprising the steps of:
    a. providing a library expressing a plurality of peptides;
    b. providing at least one surrogate *Francisella* strain;
    c. providing at least one target *Francisella* strain;
    d. contacting the surrogate *Francisella* strain with peptides of the library under such conditions that the peptides of the library may bind to the surrogate *Francisella* strain;
    e. collecting the peptides of the library that do not bind the surrogate *Francisella* strain;
    f. contacting the target *Francisella* strain with the peptides of step (e);
    g. collecting the peptides of the library that bind the target *Francisella* strain;
    h. determining an amino acid sequence of the peptides of step (g).

24. The method of claim 23 where the library is selected from the group consisting of a phage display library or a single chain antibody library.

25. The method of claim 23 further comprising adding a washing step between steps (d) and (e) and steps (f) and (g).

26. The method of claim 25 where the washing step is accomplished by washing in a wash buffer selected from the group consisting of 1X PBS and a Tris-Mg solution.

27. The method of claim 23 where the collecting step of (g) is accomplished by elution of the peptide sequences with a low pH elution buffer.

28. The method of claim 27 where the low pH buffer is a 0.2 M glycine buffer.

29. The method of claim 23 where the collecting of step (g) is accomplished by a first elution of the peptide sequence in a first elution buffer and a second elution of the peptide sequences in a second elution buffer.

30. The method of claim 29 where the pH of the first and second elution buffers is different.

31. The method of claim 31 where the pH of the first elution buffer is greater than 3.0 and less than or equal to 6.0 and the pH of the second elution buffer is greater than 1.0 and less than or equal to 3.0.

32. The method of claim 23 where the target *Francisella* strain is pathogenic for a mammal.

33. The method of claim 23 where the target *Francisella* strain is independently selected from the group consisting of *F. tularensis*, *F. tularensis* LVS, *F. philomiragia*, and *F. novicida* and the surrogate *Francisella* strain is independently selected from the group consisting of *F. tularensis*, *F. tularensis* LVS, *F. philomiragia*, and *F. novicida*.

34. The method of claim 33 where the selection of the target *Francisella* strain and the surrogate *Francisella* strain determine a binding characteristic of the peptide to the target *Francisella* strain.

35. The method of claim 23 where the target *Francisella* strain and the surrogate *Francisella* strain have a nucleic acid homology in the range of 0 to 40 percent.

36. The method of claim 23 where the target *Francisella* strain and the surrogate *Francisella* strain have a nucleic acid homology in the range of 31 to 75 percent.

37. The method of claim 23 where the target *Francisella* strain and the surrogate *Francisella* strain have a nucleic acid homology in the range of 76 to 95 percent.

38. A method for detecting the presence of a *Francisella* strain in a sample comprising the steps of:
    a. providing the sample suspected of containing the *Francisella* strain;
    b. contacting the sample with a peptide reagent identified by the method of claim 23;
    c. incubating the peptide reagent and the sample under conditions such that the peptide binds to the sample or a part thereof if a *Francisella* strain is present in the sample; and
    d. detecting said peptide bound to the sample.

39. The method of claim 38 where the sample is obtained from a subject.

40. The method of claim 39 where the sample is a blood sample, a cerebrospinal fluid sample, a genitourinary tract sample, a urine sample, a fecal sample, a sputum sample, a skin sample or a mucosal membrane sample from said subject.

41. The method of claim 38 where the sample is obtained from an environmental source.

42. The method of claim 38 where the peptide has an amino acid sequence selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 10, SEQ ID NO: 11 and combinations of the foregoing.

43. The method of claim 38 where the sample is treated to lyse the *Francisella* strain if the *Francisella* strain is present in the sample.

44. The method of claim 38 where the peptide is conjugated to a detectable label.

45. The method of claim 44 where the detectable label is an enzyme, a chromophore, a flourophore, an affinity tag, an additional peptide sequence or a radioligand.

46. The method of claim 44 where the detectable label is detected directly or indirectly.

47. The method of claim 39 where the subject is human.

48. A diagnostic kit for detecting the presence of a *Francisella* strain in a sample comprising:

a. at least one peptide identified by the method of claim 23 and capable of binding to said *Francisella* strain; and

b. a means for detecting said peptide.

49. The kit of claim 48 where the means for detecting binding comprises detecting a detectable label that is linked to said peptide.

50. The kit of claim 49 where the detectable label is an enzyme, a chromophore, a flourophore, an affinity tag, an additional peptide sequence or a radioligand.

51. The kit of claim 49 where the detectable label is detected directly or indirectly.

52. The kit of claim 48 where the at least one peptide is selected from the peptides having an amino acid sequence selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 10, SEQ ID NO: 11 and combinations of the foregoing.

53. The kit of claim 48 further comprising at least one of the components selected from the group consisting of a positive control bacterial sample, a negative control bacterial sample a negative control peptide and a set of instructions for directing the use of said kit.

54. The kit of claim 53 where the negative control peptide is a peptide having the amino acid sequence selected from the group consisting of SEQ ID NO. 4 and SEQ ID NO. 5.

55. The kit of claim 48 where the *Francisella* strain is pathogenic for a mammal.

56. The kit of claim 48 where the *Francisella* strain is selected from the group consisting of *F. tularensis*, *F. tularensis* LVS, *F. philomiragia*, *F. novicida*.

57. A method for identifying a molecule on a cell surface of a *Fransicella* strain comprising the steps of:

a. providing the *Francisella* strain;

b. providing at least one peptide identified by the method of claim 23, said peptide capable of binding to said *Francisella* strain;

c. incubating the *Francisella* strain and the peptide under conditions such that the peptide binds to the molecule on the *Francisella* strain;

d. detecting said peptide bound to the molecule; and

e. identifying the molecule.

58. The method of claim 57 where the at least one peptide is selected from the peptides having an amino acid sequence selected from the group consisting of SEQ ID NO: 2, SEQ ID NO: 3, SEQ ID NO: 8, SEQ ID NO: 9, SEQ ID NO: 6, SEQ ID NO: 7, SEQ ID NO: 10, SEQ ID NO: 11 and combinations of the foregoing.

59. The method of claim 57 where the molecule is a protein, a complex carbohydrate or a lipopolyscaccharide.

60. The method of claim 57 further comprising preparing an extract of the *Francisella* strain.

61. The method of claim 57 where the molecule is at least partially purified before the identifying of step (e) is carried out.

62. The method of claim 57 where the molecule is a protein and the identifying is carried out by determining the amino acid sequence of the protein.

63. The method of claim 57 where the *Francisella* strain is pathogenic for a mammal.

64. The method of claim 57 where the *Francisella* strain is selected from the group consisting of *F. tularensis*, *F. tularensis* LVS, *F. philomiragia*, and *F. novicida*.

65. The method of claim 57 where the peptide comprises a detectable label that is linked to said peptide and the detecting of step (d) comprises detecting the detectable label.

66. The method of claim 65 where the detectable label is an enzyme, a chromophore, a flourophore, an affinity tag, an additional peptide sequence or a radioligand.

67. The method of claim 66 where the detectable label is detected directly or indirectly.

68. The method of claim 57 further comprising the steps of:

a. providing a second *Francisella* strain wherein the gene coding for the molecule is removed; and

b. verifying that said peptide does not bind the second *Francisella* strain.